

REMARKS

This application has been carefully reviewed in light of the Office Action dated August 21, 2007. Claims 1 to 5, 7, 8, 10 to 19, 21 to 34, 37 to 48, 51 to 61, 65 to 76 and 80 to 85 are pending in the application, of which Claims 1, 11, 13, 22, 24, 38, 53 to 55 and 68 to 70 are independent. Reconsideration and further examination are respectfully requested.

Claim 6 was objected to for an informality. Claim 6 having been canceled herein, this objection is believed rendered moot and withdrawal is respectfully requested.

Claims 1 to 7, 9 to 12, 53 to 58, 62 to 73 and 77 to 85 were rejected under 35 U.S.C. § 102(e) over U.S. Patent No. 6,314,452 (Dekel). Claims 13 to 16, 18 to 20, 22 and 23 were rejected under 35 U.S.C. § 102(e) over U.S. Published Appln. No. 2003/0123744 (Chui). Claims 24 to 52 were rejected under 35 U.S.C. § 102(b) over "An Overview of the JPEG 2000 still image compression standard" (Rabbani and Joshi). Claim 8 was rejected under 35 U.S.C. § 103(a) over Dekel. Claim 17 was rejected under 35 U.S.C. § 103(a) over Chui in view of U.S. Patent No. 6,360,019 (Chaddha). Claim 21 was rejected under 35 U.S.C. § 103(a) over Chui. Claims 59 to 61 and 74 to 76 were rejected under 35 U.S.C. § 103(a) over U.S. Published Appln. No. 2003/0113027 (Chan) in view of Rabbani and Joshi. Reconsideration and withdrawal of this rejection are respectfully requested.

The present invention concerns decoding an encoded image. The decoding/encoding method used is a discrete wavelet transform method which produces an alias in an image when the encoded data is decoded halfway.

Claims 1, 11, 12, 13, 22 and 23.

Turning to specific claim language, amended independent Claim 1 is directed to a decoding method of decoding encoded image data which has been hierarchically encoded in advance by a discrete wavelet transform method. The method includes determining a size of an image to be outputted; decoding the encoded image data up to a layer of hierarchy which is one or more layers higher than a minimum number of layer/layers of hierarchy needed by an image to be equal to or exceed the determined size when image data is decoded to the minimum number of layer/layers of hierarchy; and reducing the size of the decoded image to the determined size.

Amended independent claim 13 is directed to an encoding method of hierarchically encoding an image by a discrete wavelet transform method. The method comprises determining a size of an image to be outputted; and encoding the image up to a layer of hierarchy which is one or more layers higher than a minimum number of layer/layers of hierarchy needed by an image to be equal to or exceed the determined size.

Accordingly, an image of a size which is equals to or slightly larger than the determined size is obtained when image data is decoded to the minimum number of layer/layers of hierarchy. For example, if an image of a determined size lies between the first and second layers of hierarchy, image data is decoded up to the second layer since only decoding image data up to the first layer makes the image smaller than the determined size. Thus, the minimum number of layers in this case is the number of layers up to the second layer.

In another feature of Claims 1 and 13, decoding and encoding are performed up to a layer of hierarchy which is one or more layers higher than the minimum number of layers. Because the alias occurs as a result of hierarchical coding, i.e., discrete wavelet transform,

decoding image data of one or more layers of hierarchy and reducing the size of a decoded image to the determined size can reduce aliasing.

In contrast, Dekel discloses decoding image data and Chui discloses encoding image data by hierarchical coding; however, both Dekel and Chui are silent about decoding/encoding image data up to a layer of hierarchy one or more layers higher than a minimum number of layer/layers of hierarchy needed by an image to be equal to or exceed the determined size when image data is decoded to the minimum number of layer/layers of hierarchy.

Therefore, neither Dekel nor Chui, neither alone nor in combination, disclose or suggest all of the features of either Claim 1 or of Claim 13. In light of this deficiency in Dekel and Chui, Applicant submits that amended independent Claims 1 and 13 are now in condition for allowance and respectfully requests same.

Amended independent Claims 11 and 12 are directed to an apparatus and a storage medium, respectively, substantially in accordance with the method of Claim 1. Amended independent Claims 22 and 23 are directed to an apparatus and a storage medium, respectively, substantially in accordance with the method of Claim 13. Accordingly, Applicant submits that Claims 11, 12, 22 and 23 are also now in condition for allowance and respectfully requests same.

Claims 24, 38 and 52.

Claim 24 is directed to an encoding method of hierarchically encoding an image by a discrete wavelet transform method or by using an orthogonal mirror filter. The method comprises restraining a frequency component which causes alias of an image signal of the image in advance of separating the image signal into layers of hierarchy; and separating the restrained image signal into layers of hierarchy using a hierarchy separation filter.

According to the present invention as described in Claims 24, a frequency component which causes aliasing of an image signal of the image is restrained in advance of separating the image signal into layers of hierarchy using a hierarchy separation filter. As described on page 53, line 21 to page 54, line 8 of the subject application, down sampling by the down sampler of image signals, which have undergone the analysis LPF 1203 of the wavelet transform unit, causes aliasing. Therefore, in the present invention, before processing image signals by the wavelet transform unit, or LPF 1203, frequency components, such as components at the Nyquist frequency, of the image signals which cause aliasing are restrained by LPF 101 in Fig. 19, thereby preventing occurrence of aliasing.

In contrast, Rabbani and Joshi disclose a pair of low-pass and high-pass filters in the analysis filter bank (Fig. 2 in page 8 and last two lines in right column in page 7 of Rabbani and Joshi), which may correspond to Applicant's separation filter (analysis LPF 1203 and analysis HPF 1201 of the wavelet transform unit in Fig. 19 of the subject application). However, there is no description in Rabbani and Joshi of a configuration such as LPF 101 (Fig. 19 of the subject application) which restrains frequency components that cause alias in advance of separating image signals into layers of hierarchy using the hierarchy separation filter.

Therefore, Rabbani and Joshi do not disclose all of the features of the method of Claim 24. In light of this deficiency in Rabbani and Joshi, Applicant submits that amended independent Claim 24 is now in condition for allowance and respectfully requests same.

Amended independent Claims 38 and 52 are directed to an apparatus and a storage medium, respectively, substantially in accordance with the method of Claim 24. Accordingly, Applicant submits that Claims 38 and 52 are also now in condition for allowance and respectfully requests same.

Claims 53 to 55, 68 to 70 and 83 to 85.

Claim 53 is directed to a decoding method of decoding encoded image data which has been hierarchically encoded in advance by a discrete wavelet transform method. The method comprises determining a layer of hierarchy up to which the encoded image data is to be decoded; decoding the encoded image data up to the determined layer; judging whether or not the determined layer corresponds to the highest layer of hierarchy of the encoded image data; and restraining, when the determined layer does not correspond to the highest layer, a frequency component, which corresponds to alias occurred by separating the image data into layers of hierarchy alias, of the decoded image data.

Claim 54 is directed to a decoding method of decoding encoded image data which has been hierarchically encoded in advance by a discrete wavelet transform method. The method comprises decoding all of the encoded image data; judging whether or not the encoded image data was obtained as a result of encoding all layers of hierarchy; and restraining, when all the layers of hierarchy have not been encoded, a frequency component, which corresponds to alias occurred by separating the image data into layers of hierarchy, of the decoded image data.

Claim 55 is directed to a decoding method of decoding encoded image data which has been hierarchically encoded in advance by a discrete wavelet transform method. The method comprises inputting encoded image data from external; determining a layer of hierarchy up to which the encoded image data is to be decoded; decoding the encoded image data up to the determined layer; judging whether or not all layers of hierarchy of the encoded image data have been decoded; and restraining, when all the layers of hierarchy have not been decoded, a

frequency component, which corresponds to alias occurred by separating the image data into layers of hierarchy, of the decoded image data.

Accordingly, during decoding of an encoded image, a frequency component, which corresponds to alias occurred by separating the image data into layers of hierarchy upon encoding, of the decoded image data is restrained.

Applicant submits that the discussion from above in regard to Claims 1 applies as well to Claims 53 to 55.

In addition, in regard to Chan, Chan discloses decoding image data coded by hierarchical coding. Chan describes in Figs. 6A to 6C determining the number of layers present in the input codestream in step S610 (lines 22 and 23 in [0137]), and determining in step S640 whether codestream has been decoded up to the number of layers determined in step S610 (lines 1 to 3 in [0138]). However, there is no description of "determining a layer of hierarchy up to which the encoded image is to be decoded" nor "judging whether or not the determined layer corresponds to the highest layer of hierarchy of the encoded image data". Furthermore, in step S640, the layer counter variable *l* is tested against the number of layers present in the input codestream. The layer counter variable *l* shows a layer up to which the codestream has been decoded, but does not show up to which the encoded image data is to be decoded.

Additionally, Chan does not teach to restrain a frequency component, which corresponds to alias which occurs by separating the image data into layers of hierarchy, of the decoded image data when the result of judging indicates that the determined layer does not correspond to the highest layer of the encoded image data.

Specifically in regard to Claim 54, Chan fails to disclose or suggest judging whether or not the encoded image data was obtained as a result of encoding all layers of

hierarchy. The Examiner asserts that step S640 in Fig. 6A of Chan corresponds to Applicant's judging feature, however, in step S640 of Chan, the layer counter variable l is tested against the number of layers present in the input codestream. The layer counter variable l shows a layer up to which the codestream has been decoded. Thus, it is clear that Applicant's judging feature and the process in step S640 of Chan are not at all the same.

Therefore, neither Dekel nor Chan, either alone or in combination, disclose or suggest all of the features of Claims 53 to 55. In light of this deficiency in Chan and Dekel, Applicant submits that amended independent Claims 53 to 55 are now in condition for allowance and respectfully requests same.

Amended independent Claims 68, 69 and 70 are apparatus claims substantially in accordance with method Claims 53, 54 and 55, respectively. Amended independent Claims 83, 84 and 85 are storage medium claims substantially in accordance with method Claims 53, 54 and 55, respectively. Accordingly, Applicant submits that Claims 68 to 70 and 83 to 85 are also now in condition for allowance and respectfully requests same.

The other pending claims in this application are each dependent from the independent claims discussed above and are therefore believed allowable for at least the same reasons. Because each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

CONCLUSION

No claim fees are believed due; however, should it be determined that additional claim fees are required, the Director is hereby authorized to charge such fees to Deposit Account 50-3939.

Applicant's undersigned attorney may be reached in our Costa Mesa, CA office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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